# SETUP, ADJUSTMENTS AND CALIBRATIONS

MULTIQUIP®

WHITEMAN SERIES

# MODEL HTXD6i/STXD6i

## HYDRAULIC RIDE-ON TROWEL

### (YANMAR 4TNV84T-Z-DSA2 DIESEL ENGINE)

Revision #2 (04/09/14)

**To find the latest revision of this publication, visit our website at: www.multiquip.com**

**THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.**

**PN: 32399**

# HTX6Di/STX6Di Trowel


Machine Information And Maintenance Log ..... 3
Safety Information ..... 4-9
Tools Needed ..... 10
Machine Information ..... 11
- Model ..... 11
- Serial Number ..... 11
- Program ID ..... 11

General Procedures ..... 12
- Setup Jumper Installation ..... 12
- Remove Setup Jumper *(If Installed).* ..... 12

Initial Check And Adjustments ..... 13-14
- Preliminary Charge Pressure Adjustment ..... 13
- Oil And Coolant Check ..... 13
  - *Hydraulic Oil Check ..... 13*
  - *Engine Oil ..... 13*
  - *Engine Coolant ..... 14*

Service Tool Setup And Connection ..... 15-16
- Whiteman Service Tool (WST) Installation ..... 15

Laptop Configuration ..... 17
- Connection Procedure ..... 17

Machine Setup And Calibration ..... 18-27
- Calibrate Foot Pedal ..... 18
  - *Calibration ..... 19*
- Secondary Hydraulic Fill Procedures ..... 19
- Machine Pressure Adjustment ..... 20
  - *Charge Pressure Adjustment ..... 20*
  - *Pitch Pressure Check ..... 20*
  - *Pitch Pressure Adjustment ..... 21*
  - *Steering Pressure Adjustment ..... 21*
- Trowel Speed Adjustment\Setup ..... 22
  - *Adjust Zero Stroke Position ..... 22*
  - *Left Side Trowel Speed Adjustment ..... 22*
  - *Right Side Trowel Speed Adjustment ..... 23*
  - *Calibrate Stroke Sensor ..... 23*
- Pitch Setup ..... 24
  - *Flatten Blades ..... 24*
  - *Measure Blade Leading Edge Height ..... 25*
  - *Leading Edge Height Adjustment ..... 25*
  - *Set Zero Pitch Cylinder Stops ..... 26*
  - *Pitch Sensor Calibration ..... 26*

Inspection ..... 28-29
- Fluid Levels ..... 28
- Mechanical ..... 28
- Static Blade Pitch Drift Test ..... 29

Fuse Information ..... 30

# MACHINE INFORMATION AND MAINTENANCE LOG

**Technician**_____ **Date:**_____

| Machine Information | | | |
|---|---|---|---|
| MODEL | | LH Motor Serial No. | |
| Machine Serial No. | | RH Motor Serial No. | |
| Engine Serial No. | | Program ID | |
| Pump Serial No. | | Program Version | |

| Machine Setup and Calibration Information | | | | |
|---|---|---|---|---|
| ***Hydraulic Pressure Settings*** *(Hydraulic Oil Temperature Below 125 °F)* | | ***Calibration*** | Point 1 | Point 2 |
| Charge Pressure (psi) | | Foot Pedal | | |
| Pitch Pressure (psi) | | Stroke Sensor | | |
| Steering Pressure (psi) | | Pitch Sensors | | |
| ***Blade Speed*** | | Travel (LH) | | |
| Left (rpm) | | Travel (RH) | | |
| Right (rpm) | | Stops (LH) | | |
| | | Stops (RH) | | |

| Inspection | | | | |
|---|---|---|---|---|
| ***Fuel Levels*** | ✓ | ***Leak Checks*** | | ✓ |
| Engine Oil | | Engine | | |
| Coolant | | Coolant | | |
| Hydraulic Oil | | Hydraulics | | |
| ***Mechanical*** | ✓ | ***Functional Checks*** | | ✓ |
| Grease Points | | Hour Meter | | |
| Stabilizer Rings | | Seat Switch | | |
| Hydraulics | | ***Drift Test*** | | |
| Retardant Spray System | | Travel (Start/Stop) | | |
| ***Electrical*** | ✓ | Initial Height (LH/RH) | | |
| Cooling Fan | | Final Height (LH/RH) | | |
| Switches | | | | |
| Lights and Indicators | | | | |

Do not operate or service the equipment before reading the entire manual. Safety precautions should be followed at all times when operating this equipment. Failure to read and understand the safety messages and operating instructions could result in injury to yourself and others.

## SAFETY MESSAGES

The four safety messages shown below will inform you about potential hazards that could injure you or others. The safety messages specifically address the level of exposure to the operator and are preceded by one of four words: **DANGER, WARNING, CAUTION** or **NOTICE.**

### SAFETY SYMBOLS

**DANGER**

Indicates a hazardous situation which, if not avoided, **WILL** result in **DEATH** or **SERIOUS INJURY.**

**WARNING**

Indicates a hazardous situation which, if not avoided, **COULD** result in **DEATH** or **SERIOUS INJURY.**

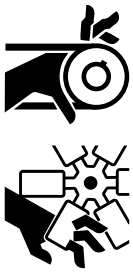
**CAUTION**

Indicates a hazardous situation which, if not avoided, **COULD** result in **MINOR** or **MODERATE INJURY.**

***NOTICE***

Addresses practices not related to personal injury.

Potential hazards associated with the operation of this equipment will be referenced with hazard symbols which may appear throughout this manual in conjunction with safety messages.

| Symbol | Safety Hazard |
|---|---|
| | Lethal exhaust gas hazards |
| | Explosive fuel hazards |
| | Burn hazards |
|  | Rotating parts hazards |
| | Pressurized fluid hazards |
| | Hydraulic fluid hazards |

## GENERAL SAFETY

**⚠ CAUTION**

- **NEVER** operate this equipment without proper protective clothing, shatterproof glasses, respiratory protection, hearing protection, steel-toed boots and other protective devices required by the job or city and state regulations.

- Avoid wearing jewelry or loose fitting clothes that may snag on the controls or moving parts as this can cause serious injury.
- **NEVER** operate this equipment when not feeling well due to fatigue, illness or when under medication.

- **NEVER** operate this equipment under the influence of drugs or alcohol.

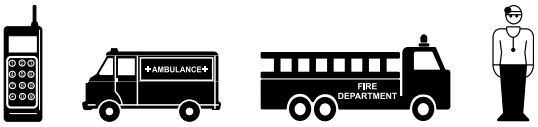
- **ALWAYS** clear the work area of any debris, tools, etc. that would constitute a hazard while the equipment is in operation.
- No one other than the operator is to be in the working area when the equipment is in operation.
- **DO NOT** use the equipment for any purpose other than its intended purposes or applications.

***NOTICE***

- This equipment should only be operated by trained and qualified personnel 18 years of age and older.
- Whenever necessary, replace nameplate, operation and safety decals when they become difficult read.
- Manufacturer does not assume responsibility for any accident due to equipment modifications. Unauthorized equipment modification will void all warranties.
- **NEVER** use accessories or attachments that are not recommended by Multiquip for this equipment. Damage to the equipment and/or injury to user may result.
- **ALWAYS** know the location of the nearest **fire extinguisher.**

- **ALWAYS** know the location of the nearest **first aid kit.**

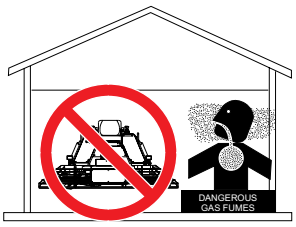
- **ALWAYS** know the location of the nearest phone or **keep a phone on the job site.** Also, know the phone numbers of the nearest **ambulance, doctor** and **fire department.** This information will be invaluable in the case of an emergency.



## TROWEL SAFETY

**⚠ DANGER**

- Engine fuel exhaust gases contain poisonous carbon monoxide. This gas is colorless and odorless, and can cause death if inhaled.
- The engine of this equipment requires an adequate free flow of cooling air. **NEVER** operate this equipment in any enclosed or narrow area where free flow of the air is restricted. If the air flow is restricted it will cause injury to people and property and serious damage to the equipment or engine.




- **NEVER** operate the equipment in an explosive atmosphere or near combustible materials. An explosion or fire could result causing severe **bodily harm or even death.**

**⚠ WARNING**

- If applicable, **NEVER** use your hand to find hydraulic leaks. Use a piece of wood or cardboard. Hydraulic fluid injected into the skin must be treated by a knowledgable physician immediately or severe injury or death can occur.

- **ALWAYS** keep clear of rotating or moving parts while operating the trowel.

- **NEVER** disconnect any **emergency or safety devices.** These devices are intended for operator safety. Disconnection of these devices can cause severe injury, bodily harm or even death. Disconnection of any of these devices will void all warranties.

**⚠ CAUTION**

- **NEVER** allow passengers or riders on the trowel during operation.
- **NEVER** lubricate components or attempt service on a running machine.
- **NEVER** place your feet or hands inside the guard rings while starting or operating this equipment.

***NOTICE***

- **ALWAYS** keep the machine in proper running condition.
- Fix damage to machine and replace any broken parts immediately.
- **ALWAYS** store equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of the reach of children and unauthorized personnel.
- A safety manual for operating and maintenance personnel of concrete power trowels produced by the Association of Equipment Manufacturers (AEM) can be obtained for a fee by ordering through their website at www.aem.org.

  Order FORM PT-160

## ENGINE SAFETY

**⚠ WARNING**

- **DO NOT** place hands or fingers inside engine compartment when engine is running.
- **NEVER** operate the engine with heat shields or guards removed.
- Keep fingers, hands hair and clothing away from all moving parts to prevent injury.

- **DO NOT** remove the radiator cap while the engine is hot. High pressure boiling water will gush out of the radiator and severely scald any persons in the general area of the trowel.
- **DO NOT** remove the coolant drain plug while the engine is hot. Hot coolant will gush out of the coolant tank and severely scald any persons in the general area of the trowel.

- **DO NOT** remove the engine oil drain plug while the engine is hot. Hot oil will gush out of the oil tank and severely scald any persons in the general area of the trowel.

**⚠ CAUTION**

- **NEVER** touch the hot exhaust manifold, muffler or cylinder. Allow these parts to cool before servicing equipment.

***NOTICE***

- **NEVER** run engine without an air filter or with a dirty air filter. Severe engine damage may occur. Service air filter frequently to prevent engine malfunction.
- **NEVER** tamper with the factory settings of the engine or engine governor. Damage to the engine or equipment can result if operating in speed ranges above the maximum allowable.

## FUEL SAFETY

**⚠ DANGER**

- **DO NOT** start the engine near spilled fuel or combustible fluids. Fuel is extremely flammable and its vapors can cause an explosion if ignited.
- **ALWAYS** refuel in a well-ventilated area, away from sparks and open flames.
- **ALWAYS** use extreme caution when working with **flammable** liquids.
- **DO NOT** fill the fuel tank while the engine is running or hot.
- **DO NOT** overfill tank, since spilled fuel could ignite if it comes into contact with hot engine parts or sparks from the ignition system.
- Store fuel in appropriate containers, in well-ventilated areas and away from sparks and flames.
- **NEVER** use fuel as a cleaning agent.
- **DO NOT** smoke around or near the equipment. Fire or explosion could result from fuel vapors or if fuel is spilled on a hot engine.

## BATTERY SAFETY

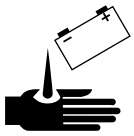
**⚠ DANGER**

- **DO NOT** drop the battery. There is a possibility that the battery will explode.
- **DO NOT** expose the battery to open flames, sparks, cigarettes, etc. The battery contains combustible gases and liquids. If these gases and liquids come into contact with a flame or spark, an explosion could occur.

**⚠ WARNING**

- **ALWAYS** wear safety glasses when handling the battery to avoid eye irritation. The battery contains acids that can cause injury to the eyes and skin.

- Use well-insulated gloves when picking up the battery.
- **ALWAYS** keep the battery charged. If the battery is not charged, combustible gas will build up.
- **DO NOT** charge battery if frozen. Battery can explode. When frozen, warm the battery to at least 61°F (16°C).
- **ALWAYS** recharge the battery in a well-ventilated environment to avoid the risk of a dangerous concentration of combustible gases.
- If the battery liquid (dilute sulfuric acid) comes into contact with **clothing or skin**, rinse skin or clothing immediately with plenty of water.



- If the battery liquid (dilute sulfuric acid) comes into contact with **eyes**, rinse eyes immediately with plenty of water and contact the nearest doctor or hospital to seek medical attention.

**⚠ CAUTION**

- **ALWAYS** disconnect the **NEGATIVE battery terminal** before performing service on the equipment.
- **ALWAYS** keep battery cables in good working condition. Repair or replace all worn cables.

## TRANSPORTING SAFETY

**⚠ CAUTION**

- **NEVER** allow any person or animal to stand underneath the equipment while lifting.
- Ride-on trowels are very heavy and awkward to move around. Use proper heavy lifting procedures and **DO NOT** attempt to lift the trowel by the guard rings.

***NOTICE***

- The easiest way to lift the trowel is to utilize the lift loops that are welded to the frame. These lift loops are located to the left and right sides of the operator's seat.

  A strap or chain can be attached to these lift loops, allowing a forklift or crane to lift the trowel up onto and off of a slab of concrete. The strap or chain should have a minimum of 2,000 pounds (1,000 kg) lifting capacity and the lifting gear must be capable of lifting at least this amount.
- **NEVER** transport trowel with float pans attached unless safety catches are used and are specifically cleared for such transport by the manufacturer.
- **NEVER** hoist the trowel more than three feet off the ground with float pans attached.
- Before lifting, make sure that the lift loops are not damaged.
- Always make sure crane or lifting device has been properly secured to the lift loops of the equipment.
- **ALWAYS** shutdown engine before transporting.
- **NEVER** lift the equipment while the engine is running.
- Tighten fuel tank cap securely and close fuel cock to prevent fuel from spilling.
- Use adequate lifting cable (wire or rope) of sufficient strength.
- **DO NOT** lift machine to unnecessary heights.
- **ALWAYS** tie down equipment during transport by securing the equipment with rope.

## TOWING SAFETY

**⚠ CAUTION**

- Check with your local county or state safety towing regulations, in addition to meeting ***Department of Transportation (DOT) Safety Towing Regulations,*** before towing your trowel.
- In order to reduce the possibility of an accident while transporting the trowel on public roads, **ALWAYS** make sure the trailer that supports the trowel and the towing vehicle are mechanically sound and in good operating condition.
- **ALWAYS** shutdown engine before transporting
- Make sure the hitch and coupling of the towing vehicle are rated equal to, or greater than the trailer "gross vehicle weight rating."
- **ALWAYS** inspect the hitch and coupling for wear. **NEVER** tow a trailer with defective hitches, couplings, chains, etc.
- Check the tire air pressure on both towing vehicle and trailer. ***Trailer tires should be inflated to 50 psi cold***. Also check the tire tread wear on both vehicles.
- **ALWAYS** make sure the trailer is equipped with a **safety chain.**
- **ALWAYS** properly attach trailer's safety chains to towing vehicle.
- **ALWAYS** make sure the vehicle and trailer directional, backup, brake and trailer lights are connected and working properly.
- DOT Requirements include the following:
  - Connect and test electric brake operation.
  - Secure portable power cables in cable tray with tie wraps.
- The maximum speed for highway towing is 55 MPH unless posted otherwise. Recommended off-road towing is not to exceed 15 MPH or less depending on type of terrain.
- Avoid sudden stops and starts. This can cause skidding, or jack-knifing. Smooth, gradual starts and stops will improve towing.
- Avoid sharp turns to prevent rolling.

- Trailer should be adjusted to a level position at all times when towing.
- Raise and lock trailer wheel stand in up position when towing.
- Place ***chock blocks*** underneath wheel to prevent rolling while parked.
- Place support blocks underneath the trailer's bumper to prevent tipping while parked.
- Use the trailer's swivel jack to adjust the trailer height to a level position while parked.

## ENVIRONMENTAL SAFETY

***NOTICE***

- Dispose of hazardous waste properly. Examples of potentially hazardous waste are used motor oil, fuel and fuel filters.

- **DO NOT** use food or plastic containers to dispose of hazardous waste.
- **DO NOT** pour waste, oil or fuel directly onto the ground, down a drain or into any water source.

The specialized tools listed in Table 1 are required to maintain and service the HTXD6i and STXD6i ride-on trowels. Fleet technicians and servicing dealers must have these tools for efficient unit setup and component calibration.

**Table 1. Setup, Calibration, and Diagnostic Tools**

| TOOL | | DESCRIPTION | PART NO. | QTY |
|---|---|---|---|---|
| Tool Kit | | Includes all tools listed below. | 32061 | 1 |
| CAN Gateway Cable | | Required to interface to the trowel MCU. Required for foot pedal calibration, pitch sync calibration, stroke cylinder calibration, engine fault code reading, diagnostics, ETC. | 22882 | 1 |
| Gauge Tool (3.25”) | | Used in calibrating one of the two blade pitch set points as part of the synchronization process. | 32044 | 2 |
| Gauge Tool (2.25”) | | Used in calibrating one of the two blade pitch set points as part of the synchronization process. | 32000 | 2 |
| Set Up Jumper | | Used to place the engine at full speed for component calibration and to simultaneously disable both the stroke follower and cold start mode. | 32007 | 1 |
| Pedal Wrench | | Used to help set the foot pedal sensor. It is also used for setting the Zero Pitch Cylinder Stops by using the thickness of the wrench. | 32020 | 1 |

**NOTICE**

The following machine information should be recorded on Machine Information and Maintenance Log for unit service tracking and for filing any warranty claims.

## MODEL

1. Enter appropriate model:
   - HTXD6i — for 6-blade HTX
   - STXD6i — for 6-blade STX

## SERIAL NUMBER

2. **Machine Serial Number** — as shown on serial tag.
3. **Engine Serial Number** — located on top of engine (E/N) (Figure 1) or stamped on side of block (Figure 2).

**Figure 1. Engine Serial Number Location 1**

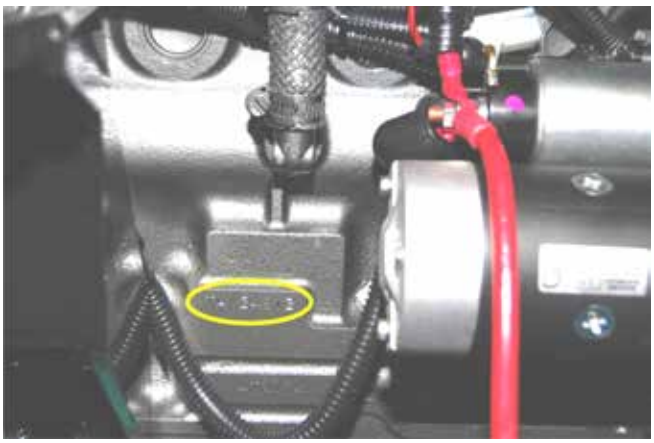


**Figure 2. Engine Serial Number Location 2**

4. **Pump Serial Number** — located on sticker on pump (Figure 3). The lower number is the pump serial number.

**Figure 3. Pump Serial Number Location**

5. **Motor Serial Number** — located on sticker on top of hydraulic motors (Figure 4). The lower number is the motor serial number.

**NOTICE**

If lot number is listed instead of the serial number, record lot number.

**Figure 4. Motor Serial Number Location**

**NOTICE**

These general procedures will be referenced in other sections throughout the manual.

## SETUP JUMPER INSTALLATION

**NOTICE**

Machine must be secured prior to installation. Installing setup jumper will:

- Disable Cold Start
- Increase Engine RPM to Full operating RPM
- Disable Stroke Follower

1. Remove Cap (P\N: 22812) on P24 of main harness (under foot platform).
2. Install Setup Jumper (P/N: 32007 on P24).

## REMOVE SETUP JUMPER (If installed).

1. Remove Setup Jumper (P\N: 32007) from P24 of main harness.
2. Re-install Cap (P\N: 22812) on P24 of main harness.

**Table 2. Disable and Re-enable Options**

| | | |
|---|---|---|
| **DISABLE (If Setup Jumper is not installed)** | **Cold Start** | 1. Open service tool. |
| | | 2. Click “machine setup” button on main page. |
| | | 3. Click “Cold Start” button under Setup Menu. |
| | | 4. Click check box next to Disabled. |
| | | 5. Press Download Button. |
| | **Stroke Follower** | 1. Open service tool. |
| | | 2. Click “machine setup” button on main page. |
| | | 3. Click “Stroke Cont.” button under Setup Menu. |
| | | 4. Click button “Disable Stroke Follower”. |
| **RE-ENABLE (If disabled via service tool)** | **Cold Start** | 1. Open service tool. |
| | | 2. Click “machine setup” button on main page. |
| | | 3. Click “Cold Start” button under Setup Menu. |
| | | 4. Uncheck box next to Disable. |
| | | 5. Press Download Button. |
| | **Stroke Follower** | 1. Open service tool. |
| | | 2. Click “machine setup” button on main page. |
| | | 3. Click “Stroke Cont.” button under Setup Menu. |
| | | 4. Click button “Enable Stroke Follower”. |

## PRELIMINARY CHARGE PRESSURE ADJUSTMENT

**NOTICE**

Skipping this step during initial set-up may cause machine to inadvertently move during further steps, due to insufficient charge pressure.

1. Loosen 1-1/16" jam nut on charge relief valve (Item A, Figure 5).
2. Use a 1/2" socket to adjust the small hex nut within the larger hex jam nut (Item B, Figure 5).
3. Rotate small hex nut (Item B, Figure 5) clockwise until bottomed out. **DO NOT** overtighten.

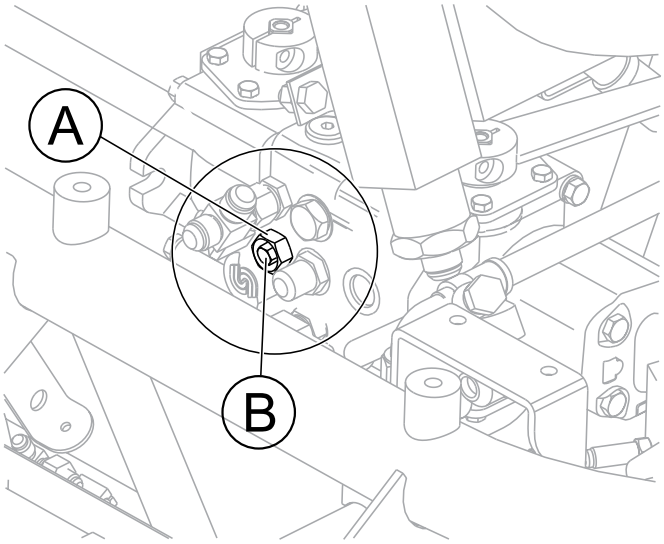



**Figure 5. Preliminary Charge Pressure Adjustment**

## OIL AND COOLANT CHECK

### Hydraulic Oil Check

1. Make sure the machine is cold.
2. Remove the starwheel cap (Figure 6) and visually check oil level.
3. Make sure that it is filled to the red line as shown in Figure 6.
4. Put back and tighten starwheel cap after checking or filling.

**NOTICE**

The sight glass is only used to check the fluid condition (dirt or air bubbles) and not to check the oil level.

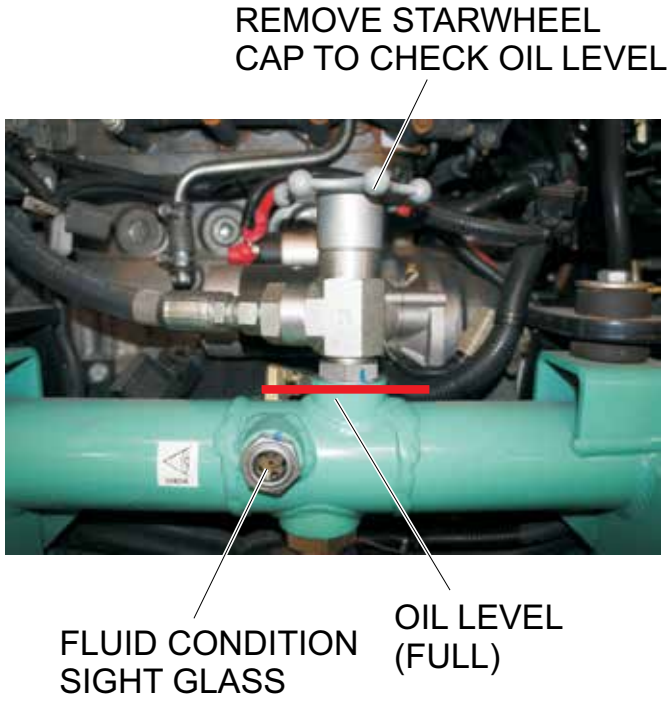



**Figure 6. Oil Level Check**

## Engine Oil

1. Ensure engine is level.
2. Remove the oil filler cap (top or side). See Figure 7.

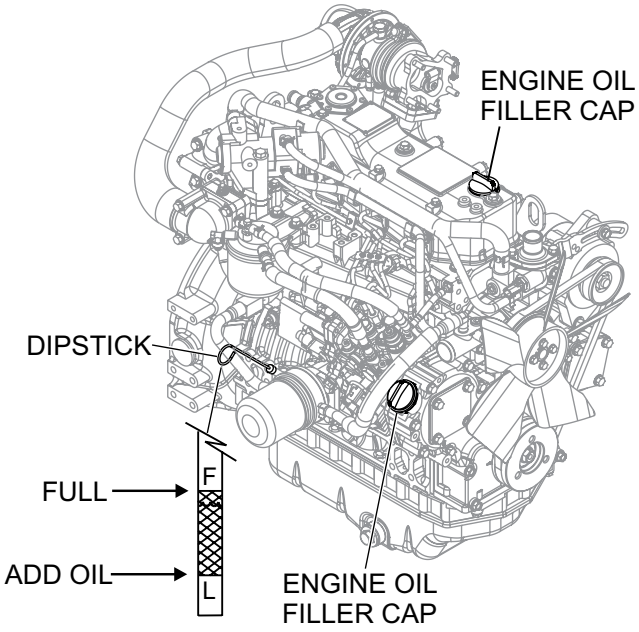



**Figure 7. Adding Engine Oil**

3. Add the required amount of engine oil at the top or side engine oil filler port.
4. Wait 3 minutes then proceed with next step.
5. Remove dipstick and wipe clean with cloth.
6. Fully reinsert dipstick.
7. Remove the dipstick. The oil level should be between the upper and lower) lines on the dipstick.
8. Add more oil if necessary and repeat steps 4 to 7.
9. Reinstall the oil cap and hand tighten. Over-tightening may damage the cap.

## Engine Coolant

1. Verify that the radiator drain cock is closed.
2. Remove radiator cap.
3. Pour engine coolant slowly into the radiator until it is even with the lip of the engine coolant filler port (Figure 8).

**Figure 8. Adding Engine Coolant**

4. Reinstall radiator cap.
5. Remove the cap on the reservoir tank.
6. Fill to the low mark (Cold Mark) with engine coolant (Figure 9).

**Figure 9. Reservoir Tank**

## WHITEMAN SERVICE TOOL (WST) INSTALLATION

**NOTICE**

Make sure that the Sauer Danfoss Plus Software is already installed before proceeding with the Whiteman Service Tool (WST) installation.

1. Call or e-mail Multiquip Technical Support or Field Service to obtain the application specific Whiteman Service Tool (WST) file.
2. Also obtain software license key through Multiquip Technical Support or Field Service.
3. The WST file will be sent to you as an attachment to an e-mail.
4. Open the e-mail sent by Multiquip and click on the attachment. On the drop-down menu, select "Save Target As" (Figure 10).

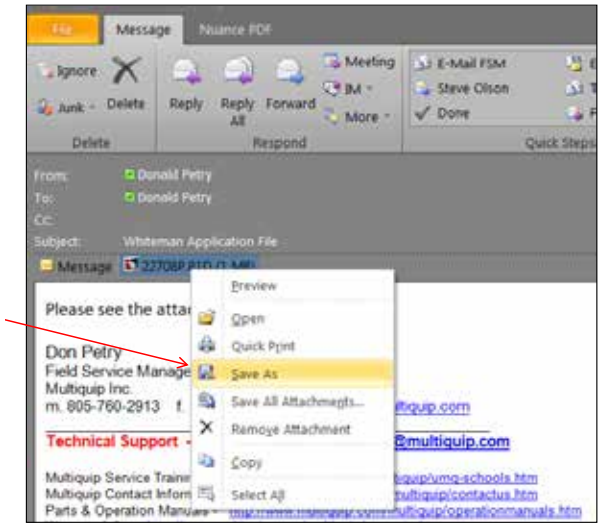



**Figure 10. Saving WST Application File**

5. Do not change the file name. Save the file to your desktop.
6. Locate and verify that the WST application file (22708P) was saved to your desktop.
7. Double-click on the 22708P Icon on your desktop. One of the screens shown in Figure 11 will appear. Click "Cancel".

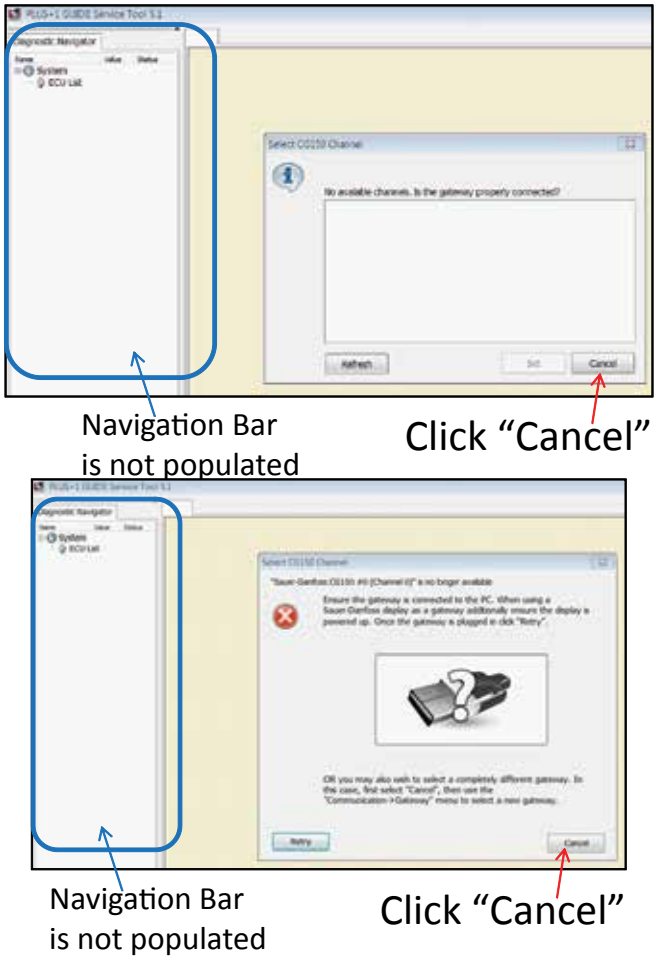



**Figure 11. WST Navigation Bar (Not Populated)**

8. Click "Cancel" again when the new screen (Figure 12) comes up.

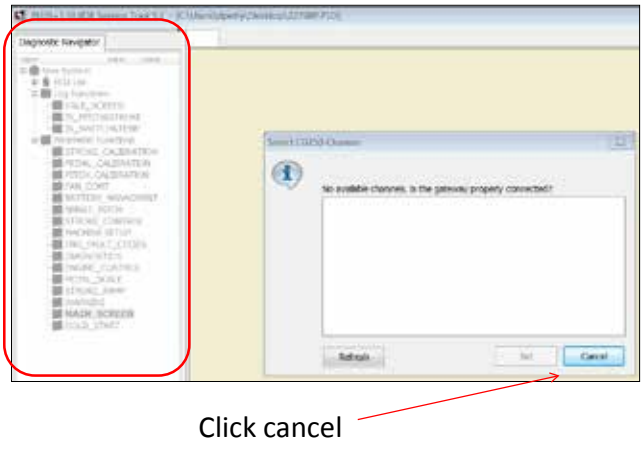



**Figure 12. WST Navigation Bar (Populated)**

9. The new screen will have both navigation and tool bars active (Figure 13.)

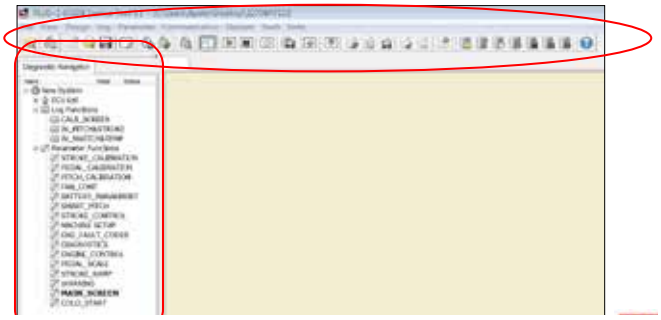


**Figure 13. WST Tool Bar**

10. Click on "Tools". On the drop-down menu, click on "License Manager" (Figure 14).

**Figure 14. WST License Manager**

11. Input the license key obtained from Multiquip (Figure 15) and click "OK".

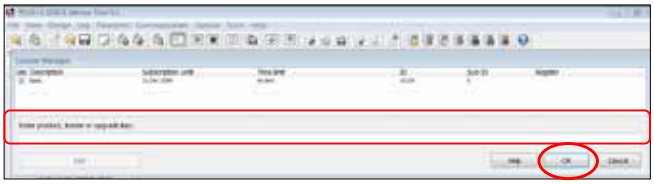


**Figure 15. Entering License Key**

## CONNECTION PROCEDURE

**NOTICE**

Make sure that the Sauer Danfoss Plus Software and Whiteman Service Tool (WST) are installed before proceeding with the connection procedure.

1. Plug the CAN Gateway cable to the trowel at the service port (Figure 16). Do not connect laptop at this time.

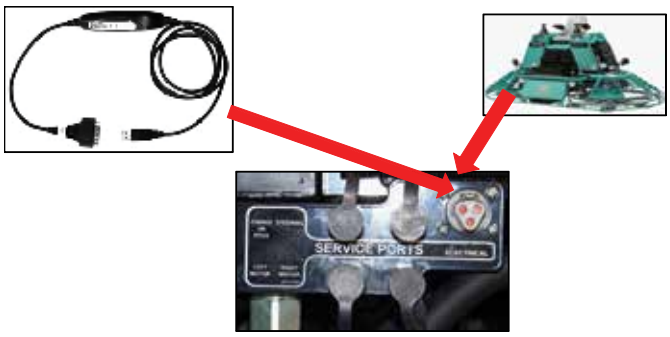



**Figure 16. CAN Gateway Cable to Service Port**

2. On the trowel, turn the ignition key to the ON position (Figure 17). This will turn on the MCU. It is not necessary to crank or turn on the engine.

**Figure 17. Ignition Key ON**

3. Connect the USB connector of the CAN Gateway cable to the USB port (Figure 18).

**Figure 18. Connecting the Laptop**

4. When the CAN Gateway cable is connected to the laptop for the first time, it is necessary to install the CAN driver software. The installation screen will appear (Figure 19). Click "Next" to install the software automatically (default).

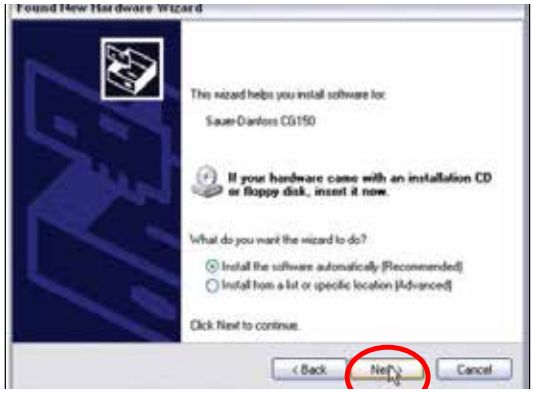



**Figure 19. CAN Driver Installation**

5. Click "Finish" on the next screen (Figure 20) to complete installation.

**Figure 20. CAN Driver Installation Complete**

6. On the Service Tool software on your laptop, the main screen should show Firmware info loaded from trowel MCU and the Machine Status box shows lamps lit (Figure 21).

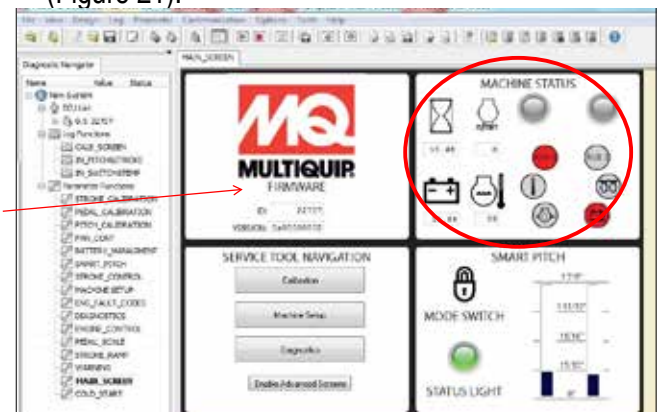



**Figure 21. Service Tool Main Screen**

## CALIBRATE FOOT PEDAL

1. Turn key to ON position but **DO NOT** start machine.
2. Click “CALIBRATION” button on machine setup page.
3. Click “CALIBRATION” button in "PEDAL SENSOR" frame (Figure 22).

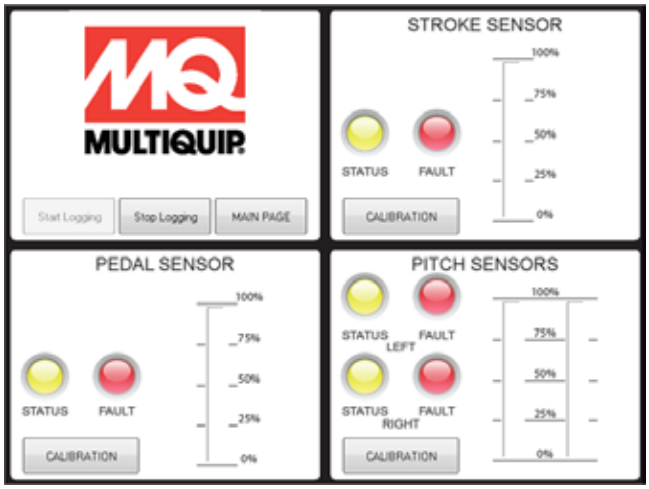



**Figure 22. Calibration Button**

> ***NOTICE***
>
> Prior to calibration of the foot pedal sensor, ensure the mechanical movement is not restricted. It should smoothly depress to the hard stop and smoothly return to full released position.

## Sensor Adjustment

> ***NOTICE***
>
> If sensor is preset, during assembly, with P\N: 32020, WRENCH, PEDAL SETUP, this step may be skipped.

1. Read % sensor voltage. If 15% to 25%, skip to calibration section. Otherwise, continue with next step to adjust sensor (Figure 23).

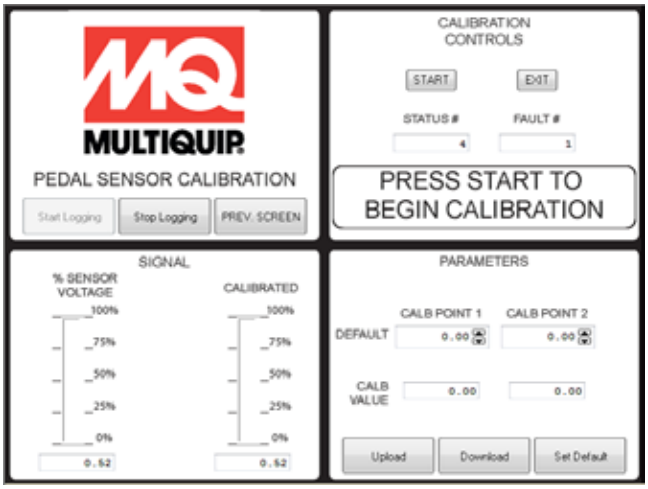



**Figure 23. % Sensor Voltage**

2. Using 7/16 wrench, rotate foot pedal shaft (Item B, Figure 24) , while holding foot pedal lever (Item A, Figure 24) in upright position, until % sensor voltage is 15% to 25%.

> ***NOTICE***
>
> This may require loosening of jamb nuts.

3. Verify that jamb nuts are tight (Item C, Figure 24)

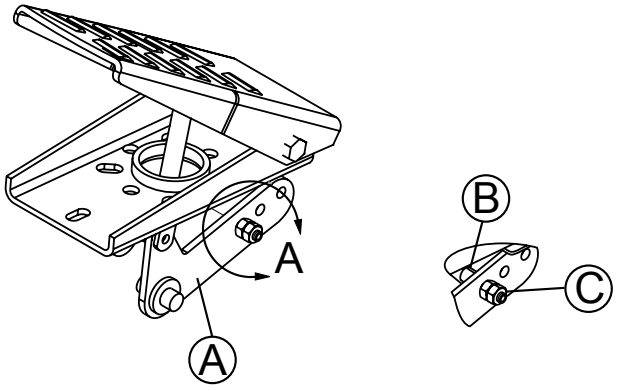



**Figure 24. Sensor Adjustment**

## Calibration

1. Set sensor zero position default:
   a. Ensure that foot pedal is fully released.
   b. Read % SENSOR VOLTAGE.
   c. Round % Sensor Voltage value to nearest percent and enter in CALB POINT 1 DEFAULT.
   d. Press "Download" button to update value in MCU.
2. Set sensor full position default:
   a. Fully depress pedal.
   b. Read % Sensor Voltage (Figure 25).
   c. Round value to nearest percent and enter in CALB POINT 2 DEFAULT.
   d. Press "Download button" to update value in MCU.

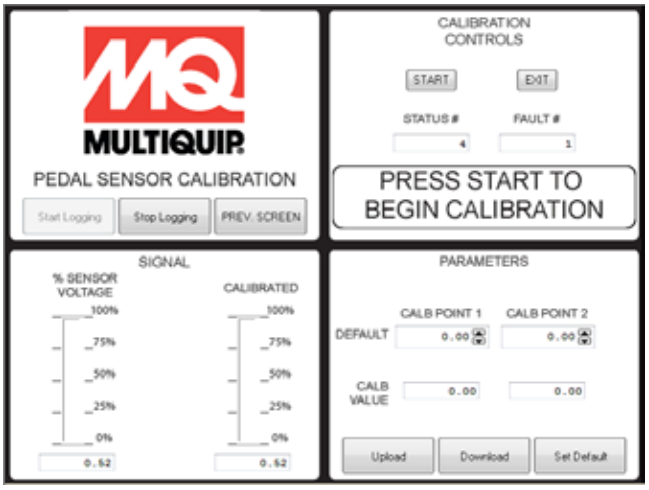



**Figure 25. Start Pedal Sensor Calibration**

3. Press “START” button to begin calibration and follow prompts.
4. Once calibrated, move pedal thru range, ensuring calibrated signal moves from 0 to 100%.
5. Record Calibration Values on Machine Information and Maintenance Log.

## SECONDARY HYDRAULIC FILL PROCEDURES

**NOTICE**

Once the oil heats up, any oil expansion will go up the overflow hose and into the fluid expansion tank.

Removing the oil fill cap, once the fluid is at operating temperature, will cause fluid loss as the expansion will cause oil to spill out.

1. Elevate machine so blades are no longer contacting floor.
2. Start the unit and run the engine.
3. Check level while machine is cold.
4. Remove the starwheel cap (Figure 6) and visually check oil level.
5. Fill as needed so oil is at the top line of the reservoir (red line in Figure 26) and that the oil level cannot be seen in the fluid condition sight glass.

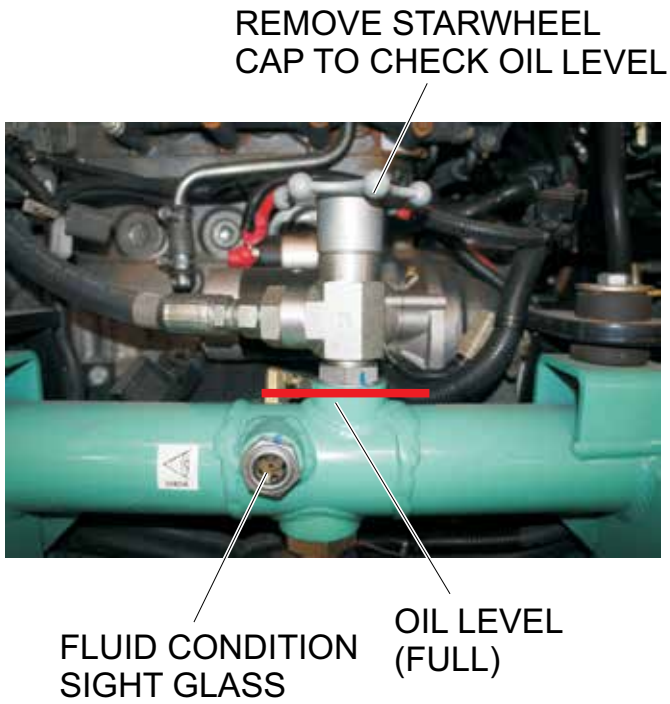



**Figure 26. Checking Oil Level**

6. Put back and tighten starwheel cap after filling.
7. Turn off machine and lower.

## MACHINE PRESSURE ADJUSTMENT

**NOTICE**

All pressures to be adjusted with machine at full engine RPM.

To adjust pressures, cold start must be disabled through the Whiteman Service Tool (WST).

### Charge Pressure Adjustment

**NOTICE**

**DO NOT** depress the foot pedal with the 300-600 PSI gauge installed. Immediate damage to the gauge will occur.

Cold start must be disabled. Failure to do so will cause immediate damage to the gauge.

1. Disable cold start.
2. With machine off, install gauge capable of reading 300 psi to Charge Or Pitch pressure test port (Figure 27).

**Figure 27. Pressure Test Ports Location**

3. Restart machine.
4. Increase engine rpm to full operating RPM (an operator must be present on the seat to reach full engine speed).
5. Loosen 1-1/16" jam nut on charge relief valve (Item A, Figure 28).

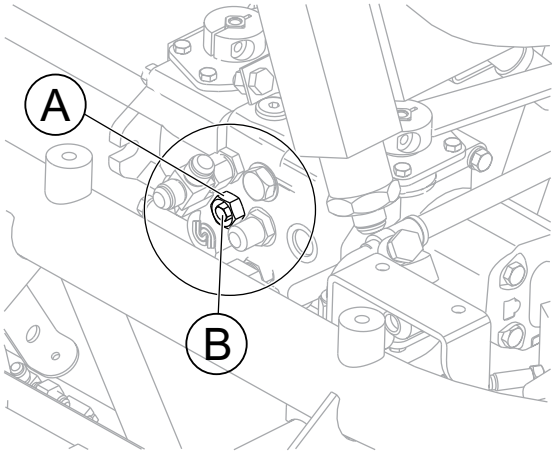



**Figure 28. Charge Pressure Adjustment**

6. Using a 1/2" socket, adjust the small hex nut within the larger hex jam nut (Item B, Figure 28).
7. Adjust to proper charge pressure: 300 ±25 psi.
8. Record pressure on Machine Information and Maintenance Log.
9. Retighten jam nut.
10. Return engine rpm to idle.
11. Turn off machine and remove gauge.

### Pitch Pressure Check

1. Disable cold start.
2. Install a 3000 PSI range pressure gauge to Charge or Pitch pressure test port (Figure 27).
3. Start machine and increase engine rpm to full operating RPM.
4. Activate left pitch switch.
5. Flatten blades (bottom out the pitch cylinders).
6. Continue to hold down pitch switch and measure pressure. If pressure is within range (1850 PSI to 2000 PSI), no adjustment is required. If pressure in not within range, proceed to Pitch Pressure Adjustment section.
7. If no adjustment is required, record pressure on Machine Information and Maintenance Log.

8. Return engine rpm to idle.
9. Turn off machine and remove gauge.

### Pitch Pressure Adjustment

1. Disable cold start.
1. Increase engine rpm to full operating RPM.
2. Loosen 3/4" jam nut on pitch relief valve (Figure 29).

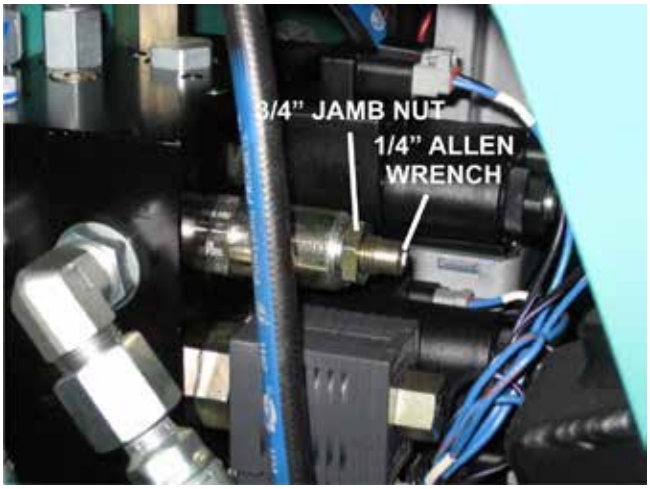



**Figure 29. Pitch Pressure Adjustment**

3. Using a 1/4" allen wrench, adjust the small hex nut within the larger hex jam nut.
4. Tighten 3/4" jam nut.
5. Check the pressure as described earlier (see Pitch Pressure Check section).
6. If pressure requires further adjustment, repeat steps 2 through 4 until pressure check reads 1850 ± 50 PSI.
7. Record pressure on Machine Information and Maintenance Log.
8. Return machine engine rpm to idle.
9. Turn off machine and remove gauge.

### Steering Pressure Adjustment

***NOTICE***

**DO NOT** depress the foot pedal with the 300-600 PSI gauge installed. Immediate damage to the gauge will occur.

1. Disable cold start.
2. Install a 300 or 600 PSI gauge on steering pressure port (Figure 27).
3. Start machine.
4. Increase engine rpm to full operating RPM.
5. Loosen 3/4" jam nut on steering valve (Figure 30).

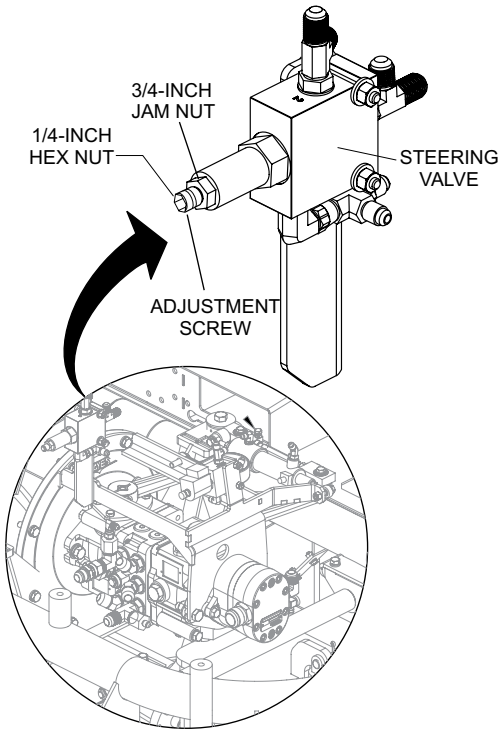



**Figure 30. Steering Pressure Adjustment**

6. Using a 1/4" allen wrench, adjust the small hex nut within the larger hex jam nut.
7. Adjust to proper steering pressure:
   - HTXD6i:
     245 psi ± 10 psi (Cold Oil)
     235 psi ± 10 psi (Hot Oil)
   - STXD6i:
     300 psi ± 10 psi (Cold Oil)
     290 psi ± 10 psi (Hot Oil)

8. Retighten jam nut.
9. Return engine to idle.
10. Turn off machine and remove gauge.
11. Record Pressure on Machine Information and Maintenance Log.
12. Re-enable cold start.

## TROWEL SPEED ADJUSTMENT\SETUP

**⚠ CAUTION**

Machine movement will occur during this step. Ensure machine is secure or operator is present in seat. All guards should be in place. Keep fingers, hands, hair, and clothing away from all moving parts to prevent injury.

### Adjust Zero Stroke Position

1. Start machine.
2. Ensure trowel is running at idle with no stroke. On a cold trowel, the unit will go into cold start mode and not be at idle. To place the trowel at idle speed, disable cold start with the WST.
3. Elevate machine so blades are no longer contacting floor. Make sure to follow proper lifting procedures. Refer to Lifting Safety Information section.
4. Ensure blades are not rotating. If rotating, continue to next step and adjust per instructions. Otherwise, set trowel on ground and verify jamb nut (Item D, Figure 31) is tight then continue to next section (Left Side Trowel Speed Adjustment).

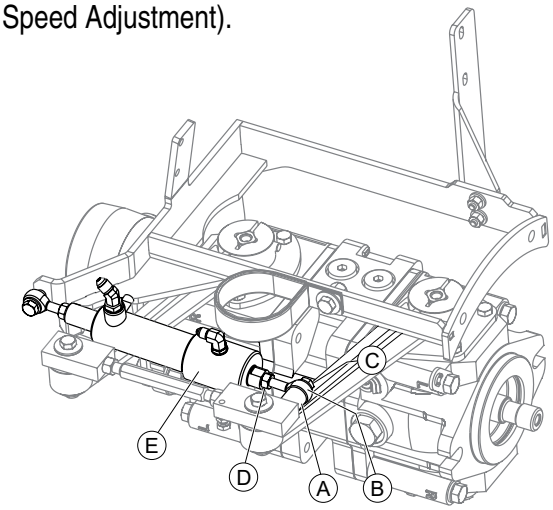



**Figure 31. Zero Stroke Position Adjustment**

5. Lower trowel and shut off.
6. Loosen Jamb nut (Item D, Figure 31).
7. Remove retaining screw (Item C, Figure 31). The spacer (Item A, Figure 31) will also come off.
8. Turn rod end (Item B, Figure 31) in, shortening overall length of cylinder assembly.
9. Reinstall retaining screw (Item C, Figure 31) and spacer (Item A, Figure 31). Apply blue loctite to make sure screw will not come off.
10. Tighten jamb nut (Item D, Figure 31).
11. Restart machine and repeat steps 2 thru 8 as necessary, until blades no longer spin.

### Left Side Trowel Speed Adjustment

***NOTICE***

Stroke sensor must be recalibrated after trowel speed adjustment for proper machine operation.

1. Install setup jumper or disable stroke follower.
2. Start machine, on bare floor and pitch until blade tips are about ½" off the ground.
3. Fully depress pedal and measure Left Side Trowel Speed.
4. Adjust speed limit screw and tighten jamb nut (Figure 32).

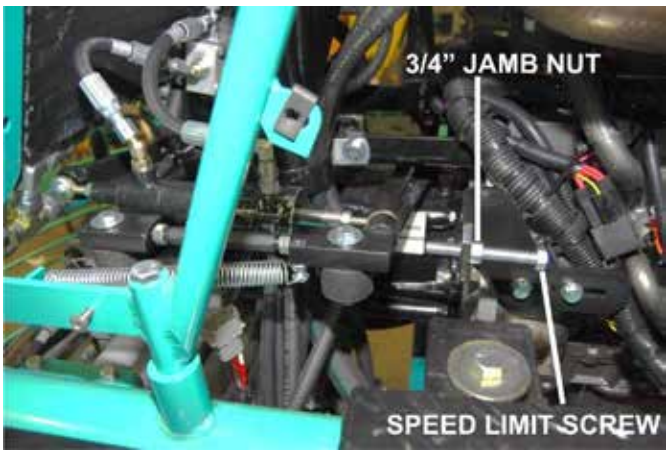



**Figure 32. Left Side Trowel Speed Adjustment**

5. Re-measure speed, repeating steps 2 and 3 until Left Side Trowel Speed is correct:
   a. HTXD6i — 157 to 160 RPM (942 to 960 Pulses per minute)
   b. STXD6i— 127 to 130 RPM (762 to 780 Pulses per minute)
6. Record L.H. speed on Machine Information and Maintenance Log in machine setup area.

## Right Side Trowel Speed Adjustment

**NOTICE**

Stroke sensor must be recalibrated after trowel speed adjustment for proper machine operation.

The trowel speeds should be adjusted on a dry concrete floor with the blades pitched slightly (tips about 1/2" off ground).

1. Verify setup jumper is installed or stroke follower is disabled.
2. Fully depress pedal, measure Left Side and Right Side Trowel Speed.
3. Adjust trowel arm connecting rod on the pump actuating lever and tighten jamb nuts (Figure 33).

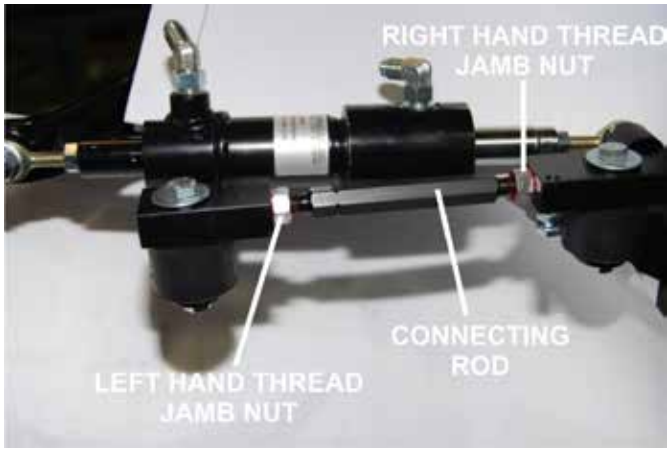



**Figure 33. Adjusting Right Side Trowel Speed**

4. Re-measure speed and repeat steps 2 and 3 until Left Side and Right side are within 1 RPM of each other.
5. Record R.H. speed on Machine Information and Maintenance Log in Machine Setup section.
6. Remove setup jumper or re-enable stroke follower.

## Calibrate Stroke Sensor

**CAUTION**

Machine movement will occur during this step. Ensure machine is secure or operator is present in seat. All guards should be in place. Keep fingers, hands, hair, and clothing away from all moving parts to prevent injury.

1. Turn machine off for at least 10 seconds.
2. Restart machine.
3. Install Setup Jumper or disable Stroke Follower.
4. Click "Calibration" button on machine setup page.
5. Click "Calibration" button in STROKE SENSOR section (Figure 34).

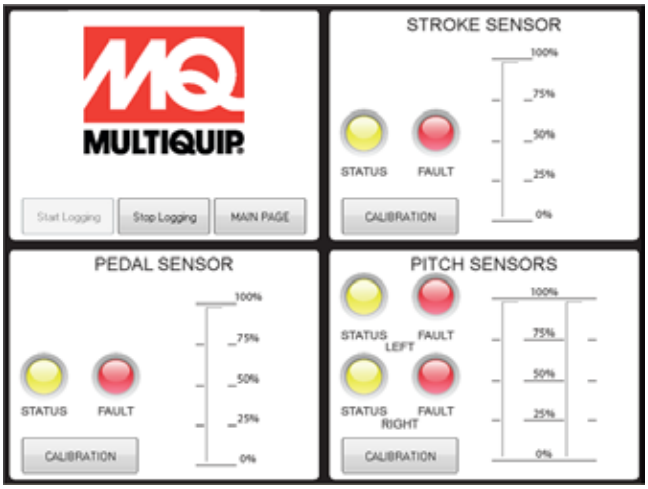



**Figure 34. Calibrate Stroke Sensor**

6. Set Sensor zero position default:
   a. Ensure foot pedal is fully released.
   b. Read % Sensor Voltage (Figure 35).

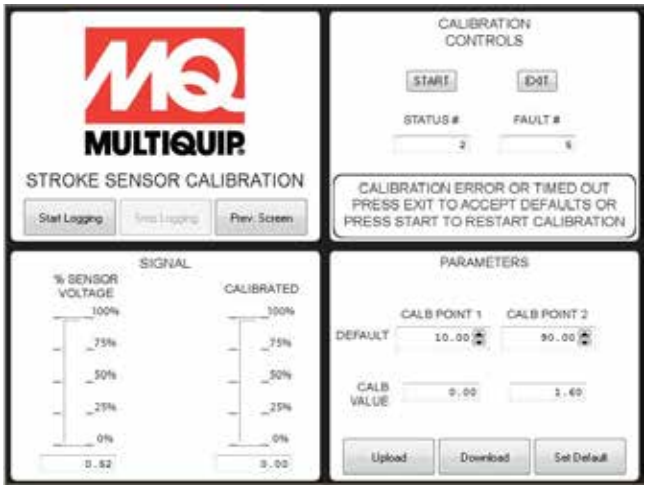



**Figure 35. Start Stroke Sensor Calibration**

   c. Round value to nearest percent and enter in CALB POINT 1 DEFAULT.
   d. Press "Download" button to update value in MCU.

7. Set Sensor full position default:
   a. Have an operator fully depress pedal and hold at full blade speed.
   b. Read % Sensor Voltage.
   c. Round value to nearest percent and enter in CALB POINT 2 DEFAULT.
   d. Press "Download" button to update value in MCU.

8. The operator must be on the unit to drive and stroke the cylinder. Have a second person press the “START” button and indicate to the operator what the prompts are on the screen. The unit will be run from no stroke to fully stroked during this calibration.

9. After calibration sequence is completed, click "EXIT".

10. Once calibrated, the second person must move pedal thru range and the operator ensures stroke follows and calibrated signal moves from 0 to 100%.

## PITCH SETUP

Prior to pitch setup, check and make sure that the following are in excellent condition to ensure eventual proper blade pitch synchronization and proper blade flatness.

- Blade condition - check for no excessive wear, new blades preferred
- Trowel arm bushings
- Pitch bolt adjustment for flatness
- Pitch bolt head for excessive wear
- Wear plate
- Thrust plate bearing and bushing - must lubricate
- Yoke for excessive wear

**⚠ CAUTION**

Machine movement will occur during this step. Ensure machine is secure or operator is present in seat. All guards should be in place. Keep fingers, hands, hair, and clothing away from all moving parts to prevent injury.

### Flatten Blades

1. Adjust blade pitch adjustment bolts as necessary to ensure machine operates smoothly (Figure 36).

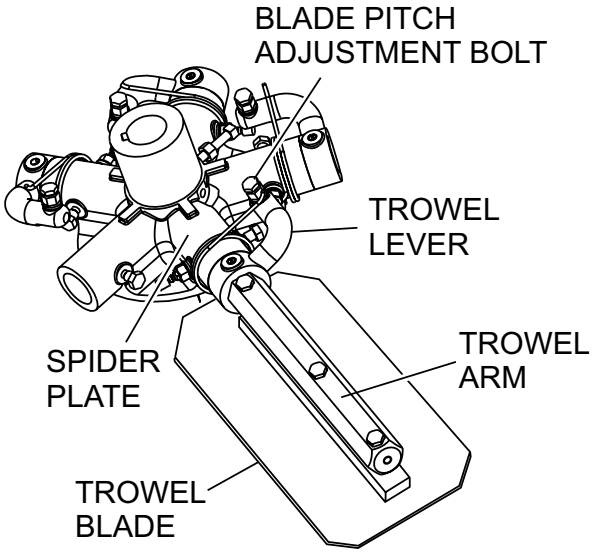



**Figure 36. Blade Pitch Adjustment**

## Measure Blade Leading Edge Height

1. Fully pitch machine by pressing and holding Twin pitch up button until pitch cylinders fully extended.
2. Choose a blade on both LH and RH Rotor. Using Gauge P/N 32044, measure height of raised leading edge ensuring it is 2.00" ±.060" (Figure 37). If the blade slides under the first step but not the next, it is within limits.

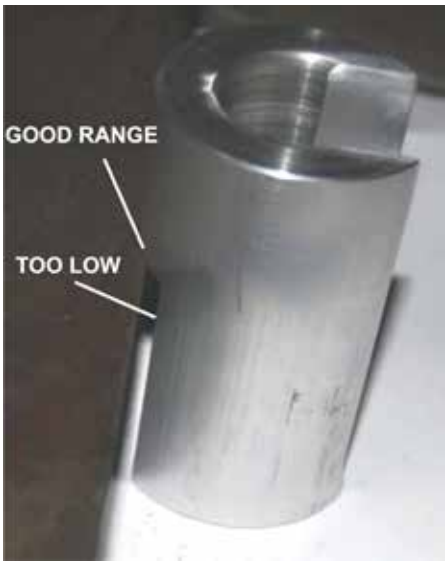



**Figure 37. Measuring Leading Edge Height**

## Leading Edge Height Adjustment

1. If leading edge height is within limits (2.000" ± .060") for left and right side, then no adjustment is needed. Otherwise, proceed to next step for adjustment.
2. Flatten blades (bottom out the pitch cylinders).
3. Remove clevis pin (Item E, Figure 38). Loosen jamb nuts (Item C, Figure 38) and adjust clevis (Item D, Figure 38) to cylinder (Item A, Figure 38) position, to raise or lower pitch as required.

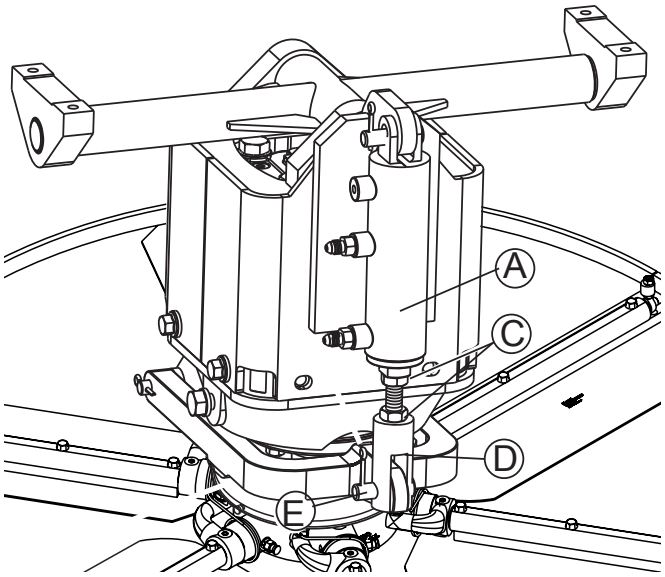



**Figure 38. Blade Leading Edge Height Adjustment**

4. Tighten jamb nuts(Item C, Figure 38) and reinstall clevis pin (Item E, Figure 38).
5. Re-measure as per instructions in "Measure Blade Leading Edge Height" section.
6. Repeat steps 2 thru 5 until Left and Right leading edge height are within limits.

## Set Zero Pitch Cylinder Stops

1. Flatten blades (bottom out the pitch cylinders).
2. Turn machine off.
3. Remove clevis pin (Item E, Figure 39) from pitch cylinder allowing yoke (Item B, Figure 39) to rest on thrust collar.

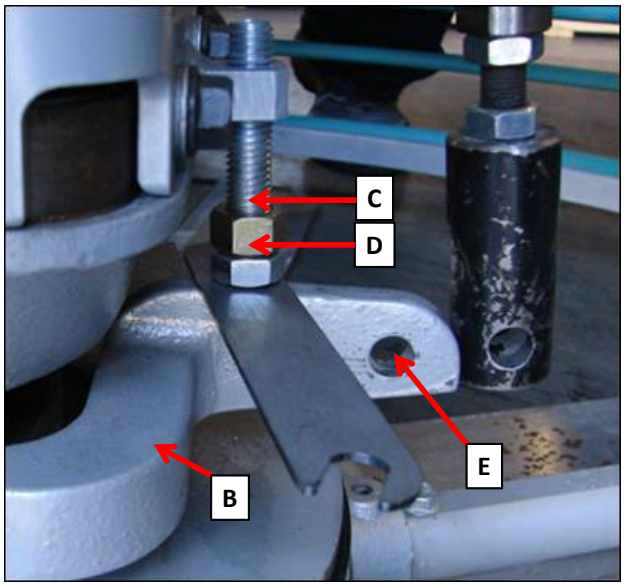



**Figure 39. Zero Pitch Adjustment**

4. Loosen jam nut (Item C, Figure 39) with ¾" wrench.
5. Set distance between head of stop (Item D, Figure 39) and yoke (Item B, Figure 39) to .075" (14 gauge steel, Gauge #32020).
6. Loctite and tighten jam nut (Item C, Figure 39).
7. Reinstall clevis pin (Item E, Figure 39) between pitch cylinder and yoke.

## Pitch Sensor Calibration

**⚠ CAUTION**

Machine movement will occur during this step. All guards should be in place. Keep fingers, hands, hair, and clothing away from all moving parts to prevent injury.

***NOTICE***

Pitch mode switch must be in the manual position.

1. Turn machine off for at least 10 seconds and then restart machine.
2. Click "Calibration" button on machine setup page.
3. Click "Calibration" button in Pitch Sensors section (Figure 40).

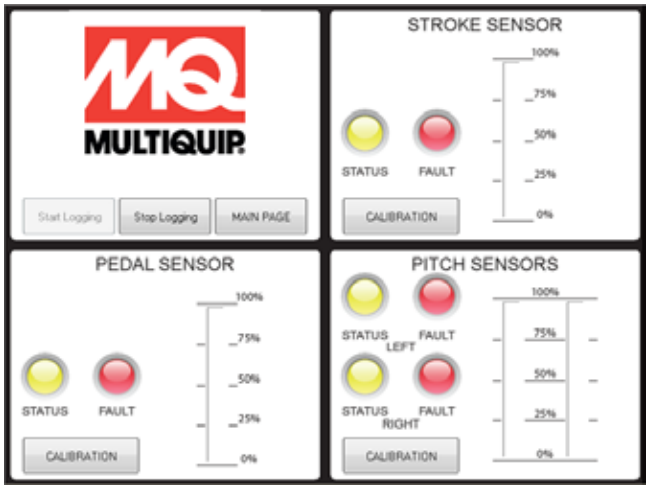



**Figure 40. Pitch Sensor Calibration**

4. Press "zero" button (Figure 42) to begin calibration.
5. Set Calibration Point 1.
   a. Press Hard Ext. button to fully extend pitch cylinders.

b. Install 3.25" Gauge (P/N 32044) over both Left and Right Cylinders as shown in Figure 41.

**Figure 41. Gauge Installation**

c. Press Hard Ret. button to retract cylinder onto gauge.

d. Verify gauge is tight between cylinder body and clevis.

e. Press "Set T1" button (Figure 42).

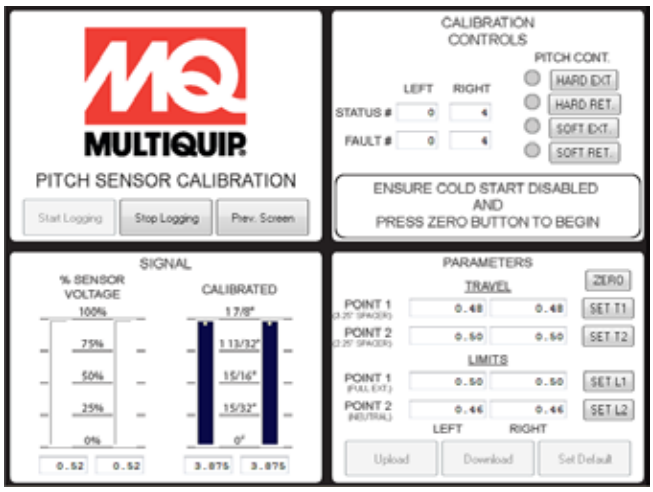



**Figure 42. Start Pitch Sensor Calibration**

f. Record values on Machine Information and Maintenance Log in Machine Setup section.

g. Press Hard Ext. Button to fully extend pitch cylinders.

h. Remove gauge.

6. Set Calibration Point 2.

   a. Install 2.25" Gauge P/N 32000 over both Left and Right Cylinders as shown in Figure 41.

   b. Press Hard Ret. Button to retract cylinder onto gauge.

   c. Verify gauge is tight between cylinder body and clevis.

   d. Press "Set T2" Button.

   e. Record values on Machine Information and Maintenance Log in Machine Setup section.

   f. Press Hard Ext. Button to fully extend pitch cylinders.

   g. Remove gauge.

7. Set Calibration Point 3.

   a. Ensure Hard Ext. is active and pitch cylinders are fully extended.

   b. Press "Set L1" button.

   c. Record values on Machine Information and Maintenance Log in Machine Setup section.

8. Set Calibration Point 4.

   a. Press Hard Ret. button to fully retract cylinders, ensure yoke is against zero pitch stop.

   b. Press Soft Ext. button, and wait until yoke is pressing against thrust collar.

   c. Press "Set L2" button.

   d. Record values on Machine Information and Maintenance Log in Machine Setup section.

9. Once calibrated, move pitch thru range ensuring calibrated signal moves from 0 to 100%.

10. Turn machine off for 10 seconds.

## FLUID LEVELS

Record the following fluid levels on Machine Information and Maintenance Log in Inspection section. Refer to Fluid Fill and Check section for procedure.

- Engine Oil
- Engine Coolant
- Hydraulic Oil

## MECHANICAL

1. **Grease Points** — Ensure that the following Grease Points are greased, wiped down and capped:
   - Thrust Collar
   - Fingers
2. **Stabilizer Rings**
   a. Verify at least 1 thread is visible below lower bolt on all heim joints (Figure 43).

**Figure 43. Visible Thread**

   b. Verify heim joint is centered, and not rotated, when bolted on Figure 44).

**Figure 44. Heim Joint Orientation**

3. **Hydraulics**
   - Spot check paint marks on fittings.
   - Ensure that there are no leaks.
4. **Retardant Spray System**
   - Fill with water and perform operational check.
   - Verify no leaks.
5. **Electrical (Cooling Fan)**
   - Verify fan cycles on when key is turned on (will remain on for 10s).
   - Verify air flow direction is outward.
6. **Lights**
   - Verify operation of all 6 machine lights.
7. **Switches**
   - Verify proper operation of all switches.
8. **Indicators**
   - Verify illumination when key is turned on (will remain on for 10s)
   - Red Stop Lamp
   - Amber Warning Lamp
   - Pitch Mode Light
   - Cruise Control Light
   - Coolant Temp
   - Aux 1
   - Aux 2
9. **Aesthetics**
   - Paint Quality
     - No bare spots
     - No scratches
   - Decals
     - Readable
     -Not torn or scratched

## STATIC BLADE PITCH DRIFT TEST

1. Switch smart pitch switch to off position.
2. Bring machine up to temperature. This will be indicated by “Cold Start” (aux 1) lamp turning off.
3. Choose one blade from each spider and mark with small X to identify.
4. Using the Twin pitch button, cycle the blades from flat to full pitch 8 times leaving the blades in the full pitch position on the eighth cycle.
5. Turn the engine off, and record time and tip height on Machine Information and Maintenance Log.
6. Leave for a 3-hour test period then re-measure tip height. Record height and time on Machine Information and Maintenance Log.
7. Compare the two measurements. Drift exceeding 3/16” in three hours is unacceptable.

Refer to Figure 45 for location on fuse panel.

| Table 3. Fuses | | | |
|---|---|---|---|
| **Fuse Number** | **Amps** | **Designator** | **Functions Fused** |
| 1 | 20 | T13 | MCU Power |
| | | T21 | Service Port Connector |
| 2 | 20 | T3 | Oil Cooler |
| 3 | 5 | T5 | Light Switch |
| | | T15 | Pitch Switches |
| 4 | 20 | T6 | Left Lights |
| 5 | 7.5 | T23 | Sprayers |
| 6 | 20 | T7 | Right Lights |

| Table 4. Ground | | |
|---|---|---|
| **Location** | **Designator** | **Functions Grounded** |
| Top Left | T12 | MCU |
| | T14 | Pitch Switch, Throttle, Cruise, LED's, Cluster gauge |
| Middle Left | T20 | Service Port Connector |
| | T24 | Spray Pumps |
| Bottom Left | T25 | Rear Lights |
| | T26 | Pitch Switch, Throttle, Cruise, LED's, Cluster gauge |
| | T28 | Engine Harness |
| Bottom Right | T1 | Pitch Valves |
| | T2 | Control Relay |
| Middle Right | T4 | Cooler Fan |
| | T27 | Front Right Lights |
| Top Right | T31 | PRM (Power Relay Module) |
| | T32 | Hour Meter |

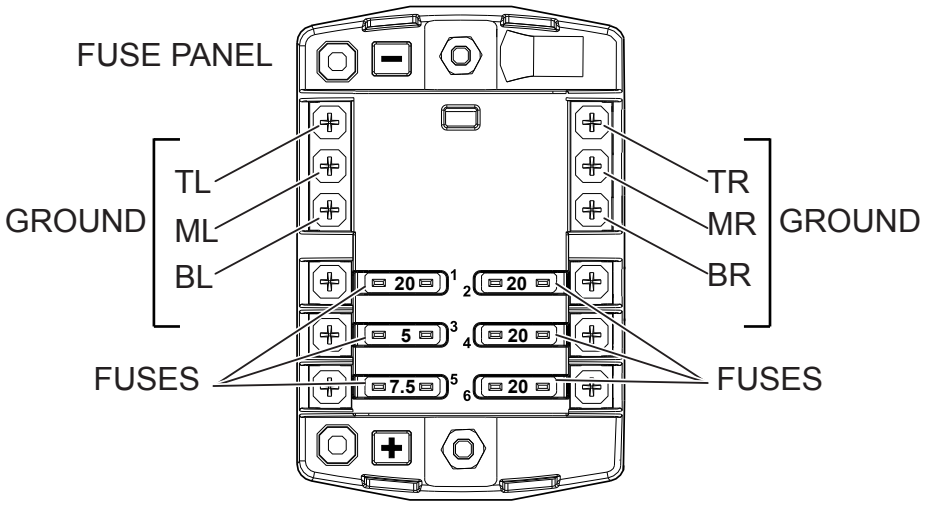



**Figure 45. Fuse and Ground Location**

# SETUP, ADJUSTMENTS AND CALIBRATIONS

## HERE'S HOW TO GET HELP

PLEASE HAVE THE MODEL AND SERIAL NUMBER ON-HAND WHEN CALLING

### UNITED STATES

***Multiquip Corporate Office***

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Fax (310) 537-3927

***MQ Parts Department***

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310-537-3700

Fax: 800-672-7877
Fax: 310-637-3284

***Service Department***

800-421-1244
310-537-3700

Fax: 310-537-4259

***Warranty Department***

800-421-1244
310-537-3700

Fax: 310-943-2249

***Technical Assistance***

800-478-1244

Fax: 310-943-2238

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